Rock Classifications in Three Dimensions: Alexander N. Winchell.

Believing that tabular classifications are desirable because of their simplicity, but that, as previously devised, they are unnecessarily limited in their presentation of mutual relationships, a new classification of igneous rocks is presented which is in tabular form in three dimensions. It is based largely upon the principles and work of Rosenbusch, but it differs from his usage in various important respects, so that responsibility for it must lie with the author.

Geo. F. Kay,
Secretary Section E

SOCIETIES AND ACADEMIES

THE AMERICAN MATHEMATICAL SOCIETY

The one hundred and sixty-second regular meeting of the society was held at Columbia University on Saturday, February 22, extending through the usual morning and afternoon sessions. The attendance included thirty-eight members. Ex-president H. S. White occupied the chair, being relieved by Professors E. W. Brown and Frank Morley. Sixteen new members were admitted: Professor E. P. Adams, Princeton University; Dr. H. L. Agard, Williams College; Professor Fiske Allen, Kansas State Normal School; M. Farid Boulad, Egyptian State Railways; Professor J. A. Caparo, Notre Dame University; Mr. C. H. Clevenger, Kansas State Agricultural College; Dr. A. L. Daniels, Jr., Yale University; Mr. W. Van N. Garretson, University of Michigan; Mr. G. M. Green, Columbia University; Mr. C. E. Love, University of Michigan; Dr. Thomas Muir, Education Office, Capetown, S. A.; Mr. J. A. Nyberg, University of Wisconsin; Dean Marion Reilly, Bryn Mawr College; Professor B. L. Remick, Kansas State Agricultural College; Professor W. V. Skiles, Georgia School of Technology; Mr. J. N. Vedder, University of Illinois. Five applications for membership were received.

The society is about to publish the lectures delivered at the Princeton colloquium in 1909 by Professors G. A. Bliss and Edward Kasner.

The following papers were read at this meeting:

Harris Hancock: "A theorem in the analytic geometry of numbers."

B. H. Camp: "The expression of a multiple integral as a simple integral."

G. M. Green: "Projective differential geometry of triple systems of surfaces."

C. A. Fischer: "A generalization of Volterra's derivative of a function of a curve."

L. B. Robinson: "Notes on the theory of systems of partial differential equations."

Oswald Veblen and J. W. Alexander, II.: "Manifolds of n dimensions."

R. G. D. Richardson: "Oscillation theorems for linear homogeneous self-adjoint partial differential equations with one parameter."

L. P. Copeland: "Concerning the theory of invariants of plane n-lines."

T. H. Gronwall: "On the summability of Fourier's series."

T. H. Gronwall: "On Lebesgue's constants in the theory of Fourier's series."

T. H. Gronwall: "On the degree of convergence of Laplace's series."

N. J. Lennes: "Note on Lebesgue and Pierpont integrals."

N. J. Lennes: "Finite sets and the foundations of arithmetic."

H. Bateman: "The expression of the equation of the general quartic curve in the form $A/xx' + B/yy' + C/zz' = 0$."

H. Bateman: "Sonin's polynomials and their relation to other functions."

Dunham Jackson: "On the accuracy of trigonometric interpolation."

C. E. Wilder: "On the degree of approximation to discontinuous functions by trigonometric sums."

Edward Kasner: "Systems of curves connected with equilong transformations."

The next regular meeting of the society will be held at Columbia University on Saturday, April 26. The Chicago Section will meet at the University of Chicago on Friday and Saturday, March 21–22. The San Francisco Section meets at Stanford University on Saturday, April 12.

F. N. Cole,
Secretary

THE ACADEMY OF SCIENCE OF ST. LOUIS

At a recent meeting of the academy held on February 17, 1913, Professor Nipher presented an abstract of a paper soon to be published by the academy, entitled "A Local Magnetic Storm."

The phenomena were produced by means of two steel magnets, placed on opposite sides of a magnetic needle, as in the Gaussian method of deflection. The needle was completely enclosed in a copper cylinder. Its motion was observed through a small glass window, covered with wire gauze, by

means of a telescope and scale. The needle was in the magnetic meridian, the two deflecting magnets being balanced against each other. The needle was also loaded with a few copper wires, and the earth's field was partially compensated, so that the period of oscillation of the needle was about twenty seconds. When one of the deflecting magnets is then connected with either terminal of an influence machine, the other terminal being grounded, its deflecting effect on the needle was increased. This effect was found to be varied by disturbances of the air in the room due to the movement of an assistant. The observed effect was not appreciably modified by wrapping the magnet in tinfoil. A puff of tobacco smoke over the deflecting magnet also changed the apparent deflecting effect. It gradually became apparent that a change in the permeability of the air was produced, when the magnet was put into contact with the influence machine in an adjoining room. Apparently, the electrified molecules of air arranged themselves along the lines of the magnetic field, with the planes of rotation of the electrical whirls within the molecules set at right angles to the magnetic lines. The permeability of the air was thus increased, in somewhat the same way that iron filings in the field of the magnet would increase it.

When the electrified air around the magnet is disturbed by a palm-leaf fan, the permeability of the air is decreased. By proper timing of these disturbing effects of the fan, the amplitude of swing of the needle may be gradually increased to four degrees of arc. By operating the fan during the other semi-vibration of the needle it may be brought quickly to rest.

Professor Nipher is now seeking to obtain photographs of auroral displays around the poles of a steel magnet.

GEORGE O. JAMES,
Corresponding Secretary

THE BOTANICAL SOCIETY OF WASHINGTON

THE eighty-sixth regular meeting of the Botanical Society was held at the Cosmos Club, Tuesday evening, February 4, 1913.

The following persons were elected to membership: Professor R. Kent Beattie, Dr. Charles Brooks, Mr. J. G. Grossenbacher, Dr. Neil E. Stevens.

The following program was presented:

MR. T. H. KEARNEY: *Indicator Value of Natural Vegetation in the Tooele Valley, Utah.*

This paper outlined the results of an investigation conducted last summer by the Offices of Alkali and Drought Resistant Plant Investigations and of Biophysical Investigations of the Bureau of Plant Industry. The Tooele Valley lies between the Oquirrh and Stansbury ranges and extends to the south shore of Great Salt Lake.

It was found that the valley is occupied by some half dozen principal plant associations, each of which is characterized by the presence of one, or, at most, two dominant species of shrubs or perennial herbs. The presence of one or another association was found to be closely indicative of the moisture relations and salt content of the substratum. The areas occupied by the different associations are often so sharply defined as to be recognizable at a distance of several miles.

The presence of a good stand and growth of sage brush (*Artemisia tridentata*) is always associated with a soil of rather light texture, very dry during the summer months, free from alkali salts and with a low water table. This *Artemisia* association occupies mainly the higher lands of the valley. Descending the valley toward the shore of Great Salt Lake, successive zones are traversed which are occupied by the following associations: (2) *Kochia vestita,* (3) *Atriplex confertifolia* (Shadscale), (4) *Atriplex confertifolia* and *Sarcobatus vermiculatus* (Greasewood), (5) *Allenrolfea occidentalis,* (6) *Distichlis spicata* (Salt Grass) and two species of *Salicornia.*

Where associations 2 and 3 occur the soil is very dry during the summer, but has a higher moisture capacity than in the *Artemisia* association and the subsoil is strongly saline. Under association 4 the soil becomes saline to the surface and the ground water table is relatively high. Associations 5 and 6 occupy the wet and highly saline soils near the level of the water surface of the lake and are interrupted by bare expanses covered with a crust of salts (chiefly sodium chloride).

The suitability for crop production of the different types of land in this valley can be predicted with much confidence from the character of the native growth.

MR. HARRY B. SHAW: *The Control of Seed Production in Beets.*

Practically all sugar-beet seed used in the United States is imported. Successful attempts have been made in Utah, Idaho and Washington to produce sugar-beet seed, but in other regions

such attempts have not been very successful, inasmuch as many of the plants have failed to mature seed. Observations were made to ascertain the cause of this. In order to make the subject readily comprehensible attention was invited to the surprising responsiveness of the beet to environment; the responses may be grouped as follows:

1. The wild beet, a winter annual, ripening and dropping its seed early in autumn. The seed germinates before winter sets in, consequently the young seedlings are for many weeks exposed to a comparatively low mean temperature. In early spring—coincident with rising temperatures—the seed stem is put forth, the paucity of foliage being conspicuous.

2. The wild annual brought into cultivation soon assumes the biennial habit; its growth being in every known way stimulated from the sowing of seed onwards; planting is carefully planned so that the young seedling shall escape protracted periods of low temperature. In response, the roots become storehouses and fail to develop reproductive parts.

3. The cultivated beet, a biennial, not alone through selection, but more especially because its environments are entirely changed; it is withheld from those periods of restrained growth seen to operate upon the wild beet in its native habitat; instead, its growth is stimulated.

4. The cultivated beet reverts to the annual habit, whenever it is exposed in the seedling stage to conditions more or less identical with those of the wild beet at the same stage of growth.

5. Even when the beet is planted out the second spring for the production of seed, there are occasions and localities which cause in those beets a greater or less tendency toward non-seeding, ranging from almost normal seed production to absolute foliage conditions.

6. When placed under conditions where growth stimulus is great and constant, as in a well-heated greenhouse, the cultivated beet becomes perennial in habit, producing, year after year, nothing but foliage.

Mr. Shaw sought in these varied manifestations a common factor, or group of factors, which acting at a critical period in the life of the plant, might be found to control the manner of its development. Experiments were carried on in Utah during 1912 to determine, if possible, the nature of the conditions responsible for the variations mentioned.

It was discovered that the condition absolutely necessary for the perfect development of the reproductive parts is a period of restrained growth in the bud rudiments of seedlings, or the buds in the crown of so-called mother beets. While in general this condition is brought about by low temperatures (a mean temperature of 38 to 45° F. apparently being required for the sugar beet) when prevailing for several weeks, the necessary degree of growth inhibition may be brought about by other factors, such as pathological conditions, drouth, starvation. The withdrawal of such a period of inhibited metabolism, according to degree, will result in the greater or less degree of approach to foliage conditions, as opposed to the development of reproductive parts.

Thus, by a study of climatic conditions, suitable locations where the production of seed may be assured, can be selected with a considerable degree of certainty. The proper time to plant the mother-beets can also be indicated, so that we may be reasonably certain that the beets will produce seed.

This necessity for a period of inhibited metabolism, and the fact that it may be brought about by the conditions mentioned, may explain the remarkable inflorescence of moribund fruit trees, or of trees that have been girdled, also the abnormal behavior of plants carried from a cool to a warm climate.

C. L. Shear,
Corresponding Secretary

Philosophical Society, University of Virginia
Mathematical and Scientific Section

The fifth meeting of the session of 1912–13 of the Mathematical and Scientific Section was held February 17.

Professor W. H. Echols read a paper entitled "The Evolutionary Construction of the Imaginary Power of a Number and Its Expression as the Exponential Function."

Professor Thomas L. Watson read a paper by himself and Professor Stephen Taber on "Magmatic Names Proposed in the Quantitative System of Classification for some New Rock Types in Virginia."

Professor Watson presented a second paper by himself and Mr. Justus H. Cline. The subject of this second paper was "Petrology of a Series of Igneous Dikes in Central Western Virginia."

Wm. A. Kepner,
Secretary

University of Virginia